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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/578,351

05/05/2006

Nobuo Aoi

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EXAMINER

CLARK, JASMINE JHIHAN B

ART UNIT

PAPER NUMBER

2815

MAIL DATE

DELIVERY MODE

01/06/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/578,351	<b>Applicant(s)</b> AOI ET AL.	
	<b>Examiner</b> Jasmine J. Clark	<b>Art Unit</b> 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09 October 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. The indicated allowability of claims 1, 2, and 14-25 is withdrawn in view of the newly discovered reference(s) to Haukka et al. (US 7,419,903). Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 102/103***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

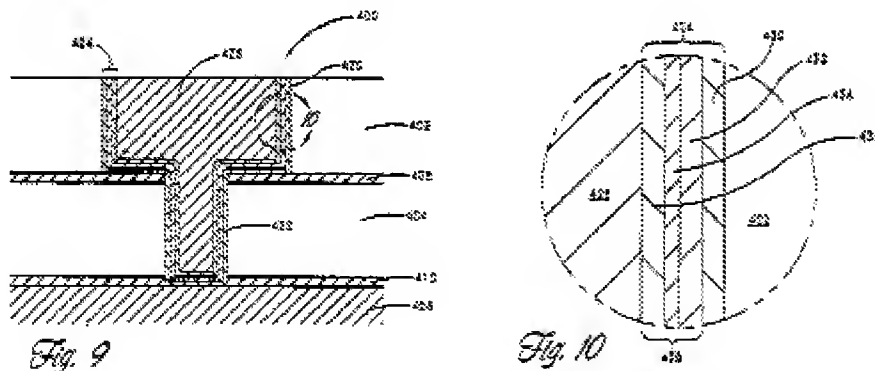
The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-12, and 14-24 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Haukka et al. (US 7,419,903).



Haukka '903 discloses a semiconductor device, comprising: an insulation film 402 and 404 in combination formed on a substrate; a buried wire 426 formed in the insulation film; and a barrier metal film 432, 434 and 436 in combination (see Fig. 9 where it is enclosed in a circle 10) formed between the insulation film and the buried wire.

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Further, Haukka '903 discloses including a transition layer which can be formed between, for example two seed layers, etc., and also metal oxide surface, (see column 6, line 7 to column 7, line 25). Regarding the recitation "the barrier metal film which is formed of a metal oxide, a transition layer and a metal film stacked in this order in the direction from a side of the barrier metal film at which the insulation film exists to a side thereof at which the buried wire 426 exists, and wherein the transition layer that is formed of a single atomic layer having substantially an intermediate composition between respective composition of the metal oxide film and the metal film", one having ordinary skill in the art would have understood that metal oxide layer, clearly meets in "the barrier metal film" recitations in the present claims. To further clarify, because Haukka '903 states "[I]n addition to the transition layers... it has been discovered that ALD metal processes are facilitated on relatively pure metallic surfaces compared to metal nitride or oxide surfaces.", examiner considers that "metal oxide" of the barrier metal, was merely conventional long prior to the present application filing date, and is simply not patentable

Although, a single atomic layer and/or a plurality of the transition layer(s) is/are not literally disclosed, it is inherent and/or would have been obvious to form a single atomic layer and/or to form a plurality of atomic layers as claimed in claims, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bermis Co.*, 193 USPQ 8.

Concerning claims 2, 3, 5, 6, 8, 9, 11 and 12, it would have been obvious to one having skill in the art at the time the invention was made to have a metal that formed the

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metal film are different and/or same element, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

At column 6, line 7 to column 32, Haukka '903 discloses various method for fabricating a semiconductor device, the method comprising the steps of:

forming a recess portion in an insulation film 402 and 404 in combination on a substrate;

forming a barrier metal film including a metal oxide (please see the above discussion regarding the metal oxide), a transition layer and a metal film stacked in this order so that the barrier metal film covers surfaces of the recess portion; and

forming a buried wire 426 on the barrier metal film so that the recess portion is filled, wherein the step forming the barrier metal film includes the step of performing a single cycle of deposition by atomic layer deposition, thereby forming the transition layer of a single atomic layer and/or a plurality of atomic layers having substantially an intermediate composition between respective compositions of the metal oxide film and the metal film.

Concerning claims 15, 16, 18, 19, 21, 22, 24 and 25, please see the above discussion under claims 2, 3, 5, 6, 8, 9, 11 and 12.

### ***Telephone Inquiry Contacts***

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3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jasmine J. Clark whose telephone number is (571) 272-1726. The examiner can normally be reached on Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JC/01/03/2009

/Jasmine J Clark/  
Primary Examiner, Art Unit 2815